ESCAP II: Analysis of Movers

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U S C E N S U S B U R E A U

Helping You Make Informed Decisions

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EXECUTIVE SUMMARY

This evaluation investigated the effect of movers, people who moved between Census Day and Accuracy and Coverage Evaluation (A.C.E.) Interview Day, on the dual system estimates. The treatment of movers is an important issue in a coverage measurement program. The results in this evaluation may be of interest to the ESCAP.

Did the movers have more of an impact on the dual system estimates in 2000 than they had in 1990?

No, there is no evidence. The mover rate was lower and the mover match rate was higher in 2000 than in 1990. The early start of A.C.E. person interviewing effectively reduced the number of movers. Match rates of movers in the A.C.E. were higher than those in the 1990 Post Enumeration Survey (PES). Match rates for movers in the A.C.E. by major poststratum variables also fell in a more stable range than in the 1990 PES. There was no evidence that the Procedure C caused serious correlation bias.

How did the rate of movers in the A.C.E. compare with that in the 1990 PES?

There was a smaller percentage of movers in the A.C.E. than in the 1990 PES because the A.C.E. started its personal interviewing earlier. A.C.E. personal interviewing started on April 24, 2000 and PES interviewing started on June 25, 1990. Using the number of inmovers as an estimate of the number of movers, there were 5.1 percent movers in 2000, compared with 7.8 percent in 1990. Among those people in the A.C.E. whose interview dates were June 25 or later, the percentage of movers was very close to that in 1990. The outmover to inmover ratio in the A.C.E. was 0.663, or approximately two to three.

How did the match rates of movers in the A.C.E. compare with those in the 1990 PES?

The outmover match rates in the A.C.E. were higher than the inmover match rates in 1990, but the differences were not as big as we expected. (We compared 2000 outmover match rates with 1990 inmover match rates because we used Procedure C in 2000 and Procedure B in 1990). Census late adds and whole person imputations might include high proportions of movers and might have reduced the mover match rates. The A.C.E. might have reduced false mover matches, too. The outmover match rates by major poststratum variables also fell in a more stable range in 2000 than in 1990. The biggest mover match rate improvements were among demographic groups that had the lowest match rates in 1990, such as American Indians on reservations, black, Hispanic, and non-owner.

How did the match results of outmovers compare with those of nonmovers in the A.C.E.?

In the A.C.E, the match rates for outmovers and nonmovers were 77.5 percent and 92.3 percent; the unresolved rates for outmovers and nonmovers were 18.45 percent and 1.65 percent; and the proxy

respondent rates for outmovers and nonmovers were 75.00 percent and 3.10 percent. In the A.C.E., information for whole household outmovers was collected from proxy interviews.

What implications do these results have on the adjustment decision?

We found no evidence that movers had more of an impact on the dual system estimates in the 2000 A.C.E. than in the 1990 PES. The fact that **things were as we expected** reassures us about the quality of the A.C.E.

BACKGROUND

The treatment of movers in the 2000 A.C.E. was different from the 1990 PES. Three types of people were collected in the A.C.E. person interviews. These were nonmovers, outmovers and inmovers. Nonmovers were people who lived at the sample address on Census Day and on A.C.E. interview day. Outmovers were people who lived at the sample address on Census Day but not on A.C.E. interview day. Inmovers were people who lived at the sample address on A.C.E. interview day but not on Census Day. Nonmovers and outmovers were matched to the census enumerations within the sample cluster and in surrounding blocks. The number of movers was estimated using the number of inmovers and the match rate of movers was estimated using the match rate of outmovers. This is known as Procedure C. An advantage of Procedure C over the procedure in 1990 was that it did not require the cumbersome operation of identifying the geography of the inmovers' Census Day address and matching to the census at the inmovers' address/search area.

Procedure B was used in the 1990 PES. Procedure B identified the current residents, such as, nonmovers and inmovers, in each sample housing unit. The Census Day address for inmovers was collected, along with other information to identify the census geography of the mover addresses. Nonmovers were matched to the census enumerations within block cluster and in surrounding blocks. Inmovers were matched at their Census Day address. Both the number of movers and the match rate of movers were estimated by inmovers.

1. BACKGROUND

The personal interviews of the Accuracy and Coverage Evaluation (A.C.E.) started on April 24, 2000 and were completed by September 11, 2000. This evaluation investigated the effects of A.C.E. movers, people who moved between Census Day and A.C.E. interview day, on the dual system estimates.

Procedure A was used in the 1995 and 1996 Integrated Coverage Measurement. Procedure A attempted to reconstruct the Census Day household. The Census Day household was composed of nonmovers and outmovers. Procedure A compared the nonmovers and outmovers to the census enumeration within block cluster (the search area). The number of movers was estimated from outmovers and the match rate for movers was estimated by matching the outmovers.

Procedure B was used in the 1990 Post Enumeration Survey (PES). Procedure B identified the current residents in the sample housing unit, those who lived in the sample housing unit at the time of the interview and on Census Day (nonmovers) and those who lived in the sample housing unit at the time of the interview but not on Census Day (inmovers). The Census Day address for inmovers was collected, along with other information to identify the census geography of the inmover's addresses. Nonmovers were matched to the census enumerations within block cluster and in surrounding blocks. Inmovers were matched at their Census Day address. The number of movers and the match rate of movers were estimated from those of inmovers.

Procedure C was used in the 2000 A.C.E. to treat movers. In Procedure C, the person interview identified people who lived in the sample housing unit on A.C.E. interview day and on Census Day (nonmovers), people who lived in the sample housing unit on A.C.E. interview day but not on Census Day (inmovers), and people who lived in the sample housing unit on Census Day but not on A.C.E. interview day (outmovers). Nonmovers and outmovers were matched to the census enumerations within the sample cluster and in surrounding blocks. The number of movers was estimated by that inmovers and the match rate of movers was estimated by that of outmovers. An advantage of Procedure C was that it did not require the cumbersome operation of identifying the geography of the inmovers' Census Day address and matching it to the census at the inmovers' address/search area.

Alberti and Anolik (1991) investigated mover matching in the 1990 PES. An evaluation of the classification errors of mover status and residence status in the 2000 A.C.E. can be found in Raglin and Krejsa (2001).

This analysis investigated the effects of movers in the 2000 A.C.E. on matching and on the dual system estimates, and compared them with those in the 1990 PES.

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2. METHODS

In this section, we describe the methodology used in this evaluation.

2.1 What were the effects of mover matching on the dual system estimates (DSE)?

The dual system estimate (DSE) was computed in each poststratum:

$$DSE = DD \times \frac{CE}{N_e} \times \frac{N_p}{M},$$

where,
DD=the number of census data defined persons eligible and available for A.C.E. matching;
CE=the estimated number of correct enumerations from the E sample;
N_e=the estimated number of E-sample total;
M=the estimated number of persons in the P sample who matched to the census;
N_p=the estimated number of P-sample total.

The DSE component that was directly affected by mover matching was the P-sample match rate, N_p/M. Using Procedure C, this equals

$$\frac{N_{non} + N_{in}}{M_{non} + N_{in} \times \frac{M_{out}}{N_{out}}}$$

or alternatively,

$$\frac{1 + \frac{N_{in}}{N_{non}}}{\frac{M_{non}}{N_{non}} + \frac{N_{in}}{N_{non}} \times \frac{M_{out}}{N_{out}}},$$

where,
N_{non}=the number of nonmovers,
M_{non}=the number of nonmover matches,
N_{out}=the number of outmovers,
M_{out}=the number of outmover matches,
N_{in}=the number of inmovers.

Hence, the DSE for a poststratum was a function of the match rate of nonmovers, the match rate of outmovers and the inmover to nonmover ratio. This evaluation investigated these elements by:

- comparing the inmover to nonmover ratio and percent of movers in 2000 and in 1990;
- comparing the match rates of movers in 2000 with those in 1990;
- analyzing the sensitivity of the dual system estimates in response to the changes in the inmover to nonmover ratio, and in response to the changes in the match rates of outmovers;
- investigating other measures, such as outmover to inmover ratio, noninterviews,

unresolved rate, and proxy rate by mover status in 2000.

2.2 How did we compute the P-sample match rates?

P-sample person match rate was computed using Procedure C. The number of movers in a collapsed poststratum was the number of inmovers in that poststratum, and the number of mover matches in a poststratum was the match rate of outmovers times the number of inmovers in that poststratum. The number of P-sample people was the sum of nonmovers and movers over all poststrata. The number of P-sample matches was the sum of nonmover matches and mover matches over all poststrata. The match rate was the weighted number of matches divided by the weighted P-sample total. The exception was that when a collapsed poststratum had less than 10 (unweighted) outmovers, Procedure A was used. See Haines (2001b) for more details.

2.3 How were the results weighted?

All results except for those in Table C-2 and Table C-3 in Appendix C were weighted. For weighted counts of the 2000 A.C.E., the weights reflected the probability of selection for all stages of sampling. A noninterview adjustment for Census Day interviews was applied to nonmovers and outmovers, and a noninterview adjustment for A.C.E. interview day interview was applied to inmovers. With the exception of Table 9 and Table 10, a probability of residence was also applied to nonmovers and outmovers whose residence status was unresolved. For weighted counts of the 1990 PES, the weights reflected the probability of selection at all stages of sampling, and noninterview adjustment.

3. LIMITS

The following issues and errors are beyond the scope of this evaluation:

- Matching errors
- Errors in identifying movers and residence status
- Errors in data keying,
- Errors due to nonresponse,
- Response errors,
- Imputation errors,
- Correlation biases.

This analysis was for the 50 states in the U.S. only. Puerto Rico was excluded from the analysis. Another limitation that prevented us from conducting meaningful analysis of noninterview rates by mover status was that mover status could not be determined in a majority of the noninterview cases.

4. RESULTS

In this section, we give the result of this evaluation.

4.1. How did the proportion of movers in the 2000 A.C.E. compare with the 1990 PES?

We found that there was a smaller proportion of movers in the A.C.E. than in the 1990 PES.

4.1.1. How many nonmovers and movers were found in the 2000 A.C.E.? How did the percentage of movers in the 2000 A.C.E. compare with the 1990 PES?

The 2000 A.C.E. contained a smaller percentage of movers than the 1990 PES. When using the number of inmovers as an estimate of the number of movers, there were 5.1 percent movers in the 2000 A.C.E., compared with 7.8 percent in the 1990 PES.

Table 1 shows the numbers of nonmovers, outmovers and inmovers in the 2000 A.C.E. Partial household movers were movers in households with a mixture of nonmovers and movers. Whole household movers were movers in households without nonmovers.

Table 1. Movers and nonmovers in the 2000 A.C.E.

Mover status	Weighted count	Percent (outmover as movers)	Percent (inmover as movers)
Nonmovers (residents on Census Day)	249,705,184	96.6	94.9
Outmovers (residents on Census Day)	8,842,198	3.4	
Whole household outmovers	6,528,333	2.5	
Partial household outmovers	2,313,865	0.9	
Inmovers	13,332,075		5.1
Whole household inmovers (had outmovers)	3,664,237		1.4
Whole household inmovers[1] (No outmovers)	6,698,173		2.6
Partial household inmovers	2,969,665		1.1

[1] This included noninterviews for the Census Day interview, vacants on Census Day, etc.

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Table 2 shows the weighted numbers of nonmovers and inmovers in the 1990 PES.

Table 2. Movers and nonmovers in the 1990 PES

Mover status	Count	Percent
Nonmovers	222,302,618	92.2
Inmovers	18,870,178	7.8
Total	**241,172,796**	**100.0**

The main reason for a smaller percentage of inmovers in the 2000 A.C.E. was that A.C.E. started person interviewing earlier. Hence, there were fewer people who moved between Census Day and A.C.E. interview day.

The dates of interview operations for 2000 A.C.E. were:

- Telephone Phase, April 24, 2000-June 13, 2000;

- Personal Visit Phase, June 19, 2000-September 11, 2000;

- Nonresponse Conversion, July 27, 2000-September 11, 2000.

In 1990, PES person interviewing was scheduled to start on June 25 and to end on July 27. On June 25, "however, Census non-response follow-up was still being conducted in many areas. Therefore, the PES interviewing had to be delayed, and the end of interviewing was shifted accordingly. PES interviewing was completed in most areas by the end of July and finished everywhere by early September." (Hogan 1993). In 2000, almost one half of the interviewing work load was completed by June 24. Among persons whose interview dates were on or after June 25, the mover rate (8.2%) was quite comparable with that in the 1990 PES (7.8%). Table 3 shows the percent inmovers by interview date.

Table 3. Percent inmovers in the 2000 A.C.E. by interview date

Date of Interview	Percent inmover	Person interview workload completed (unweighted percent of cases)
Before June 24, 2000	2.1	44.5
June 25, 2000 or later	8.2	55.5

4.1.2. What were the mover ratios in the 2000 A.C.E.? How did they compare with the 1990 PES?

The inmover to nonmover ratios (I/N ratio) was 0.053 in the 2000 A.C.E. compared with 0.085 in the 1990 PES. The outmover to inmover ratio (O/I ratio) was 0.663, or approximately two outmovers for every three inmovers in the 2000 A.C.E. (The unweighted ratio was 0.649).

Table 4. Comparison of mover ratios for the 2000 A.C.E. and the 1990 PES

2000 A.C.E.		1990 PES
I/N ratio	O/I ratio	I/N ratio
0.053	0.663	0.085

Mover ratios by region, by tenure, by race domain, and by sex age group are in Appendix A. These tables show that the inmover to nonmover ratios were lower in the 2000 A.C.E. than in the 1990 PES for all regions, all tenures, all race domains, and all sex age groups. Three demographic groups that had the highest inmover to nonmover ratios were males of age 18-29 (0.117), females of age 18-29 (0.115), and non-owners (0.112). These were the groups having more than 10 percent movers.

The outmover to inmover ratio measured how successfully the A.C.E. collected information about outmovers who were not residents at the time of their interviews. Excluding the group of Hawaiian and Pacific Islanders, an outlier whose outmover to inmover ratio was 0.363, the outmover to inmover ratios of all other groups had a range between 0.510 and 0.757. The low outmover to inmover ratios for some racial/ethnic groups reflected the difficulty of identifying the race for outmovers in these groups.

By region, both inmover to nonmover ratios and the outmover to inmover ratios in 2000 were lower in the Northeast and in the Midwest than in the South and in the West.

4.2. What were the effects of mover matching on the estimates in 2000 and in 1990?

It was the match rates of movers not the number of movers that had a major impact on the dual system estimation. Match rates of movers were higher in the A.C.E. than in the 1990 PES. Movers contributed to about one third of the net undercounts measured by the A.C.E.

4.2.1. What were the match rates of movers and nonmovers in the 2000 A.C.E.? How did they compare with the 1990 PES?

Compared with the 1990 PES, the match rates in the 2000 A.C.E. were generally higher for movers, although they were lower for nonmovers.   The exceptions were owners and females of age 50 or older who had lower mover match rates in 2000. Mover match rates by major poststratum variables in 2000 also fell in a more stable range than in 1990 (See Appendix B).

Table 5. Comparison of match rates in percent by mover status (standard error)

Nonmovers		Movers		P-sample	
2000[1]	**1990**	**2000[1] outmovers**	**1990 inmovers**	**2000[1]**	**1990**
92.3	93.7	77.5	75.2	91.6	92.2
(0.1)	(0.2)	(0.6)	(0.6)	(0.1)	(0.2)

[1] 2000 nonmatch rates were computed using Procedue C, i.e., adjusted for the number of inmovers

Higher and more stable mover match rates in the 2000 A.C.E. confirmed the advantage of Procedure C over Procedure B. Using Procedure B in the 1990 PES, inmovers were matched to census people in the block where their Census Day address was located. This difficult matching process might have resulted in lower 1990 mover match rates.   In 2000 A.C.E., outmovers were matched to census people in the sample block clusters that made the mover matching much easier.

The population groups with the biggest mover match rates improvements in 2000 over 1990 were among those groups which had the lowest mover match rates in the 1990 PES. Table 6 shows the differences of mover match rates in 2000 and in 1990 for population groups shown Appendix B. This table was sorted by descending order of the difference in mover match rates.

However, the magnitudes of the mover match rate improvement over 1990 at the national level were less than we expected. Census late adds and whole person imputations might have contained high proportions of movers. The effective mover match rates might have been higher if these cases were included in the matching. The 2000 A.C.E. might also have fewer false matches.

Table 6. Differences of mover match rates in 2000 and in 1990

2000 population group	Difference of mover match rates of 2000 and 1990 (percent)	Standard error of the difference (percent)	Statistical significant at the 0.1 level?	Inmover match rate in 1990 PES (percent)
American Indian on reserves	45.5	10.9	Yes	30.6
Black	10.0	2.3	Yes	63.5
Asian & Pacific Islanders	9.4	4.6	Yes	68.1
Hispanic	6.8	2.3	Yes	66.5
Non-owner	5.6	1.2	Yes	70.1
30-49 male	3.3	1.6	Yes	72.3
Midwest	3.1	1.6	No	79.4
1-17	3.0	1.5	Yes	74.0
18-29 male	2.9	1.3	Yes	73.2
18-29 female	2.4	1.4	No	75.7
West	2.4	1.6	No	74.5
U.S.	*2.3*	*0.8*	*Yes*	*75.2*
South	2.3	1.3	No	72.3
Northeast	1.9	2.5	No	75.9
White	1.0	1.0	No	78.3
50+ male	0.3	2.5	No	79.2
30-49 female	0.1	1.7	No	77.8
50+ female	-0.5	2.1	No	82.2
Owner	-2.3	1.1	Yes	82.6

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4.2.2 How sensitive were the dual system estimates to changes of the mover match rates and the number of inmovers?

We considered these scenarios:

1. The number of inmovers increased (or decreased) the same percentage in each poststratum. The number of nonmovers, nonmover match rate and outmover match rate were unchanged.

Results in Table 7 show that the DSE was quite robust against errors in estimating the number of inmovers.

Table 7. Effects on the DSE when the number of inmovers changed

Percent of inmovers increased	Net change of DSE	I/N ratios	Match rate (in percent)
-15	-273,820	0.0454	91.69
-10	-181,908	0.0481	91.66
10	179,415	0.0587	91.52
15	268,210	0.0614	91.48

2. The outmover match rate in each poststratum increased or decreased proportionally to the difference of the nonmover match rate and the outmover match rate. Nonmover match rate and inmover to nonmover ratio were unchanged.

Table 8 shows how the DSE would change if r percent of the difference of the nonmover match rate and the outmover match rate were added to the outmover match rate in each poststratum. When r=100, mover match rate would equal the nonmover match rate in each poststratum.

Table 8. Effects on the DSE when the outmover match rate changed

r	Net change of DSE	I/N ratios	Match rate (%)
-50	1,004,843	0.0534	91.28
-20	400,105	0.0534	91.46
-10	199,750	0.0534	91.53
10	! 199,150	0.0534	91.65
20	! 397,704	0.0534	91.71
50	! 989,832	0.0534	91.90
100	! 1,965,173	0.0534	92.21

Notice that the difference of outmover match rate and nonmover match rate in the U.S. was about 15 percent and a value of r=10 corresponded to approximately 1.5 percent in the mover match rate change in the national level. Table 8 indicates that the changes in mover match rates could have significant impacts on the DSE.

4.2.3 What was the contribution of movers to the net undercount measured by the A.C.E.?

We estimated that movers contributed to about one third of the net undercount measured by the A.C.E.

People who moved around the Census Day were more likely to be missed or to be counted incorrectly in the Census than other people. To estimate the contribution of movers to the net undercounts, we estimated a hypothetical DSE when movers were excluded from the P sample and the E sample. (Table 8 shows that the DSE would have 1,965,173 fewer people if we excluded the movers from the P sample.) To estimate the correct enumeration rate when excluding the movers from the E sample, we used the E-sample addresses that matched to P-sample addresses where the whole household was outmovers. The correct enumeration rate among the E-sample people in these addresses was 90.4 percent. Then we used 90.4 percent as an estimate of the correct enumeration rate for all movers. Since there were 95.3 percent correct enumerations and 5.1 percent movers in the E sample, the estimated correct enumeration rate for nonmovers was 95.6 percent. Using only nonmovers in the P sample and applying a factor 0.956/0.953 to the correct enumeration rate in each collapsed poststratum, the hypothetical DSE excluding movers would be about 1.1 million less than the production DSE. This approach estimated that movers contributed to about one third of the 3.3 million net undercount estimated by the A.C.E.

4.3. What were the unresolved status rates and proxy respondent rates by mover status?

Outmovers had higher unresolved rates and higher proxy respondent rates than nonmovers.

4.3.1. What were the unresolved status rates by mover status?

In the 2000 A.C.E., there was a small percentage (2.25%) of P-sample persons whose residence status was unresolved. Some of these people (1.19% of the P-sample, most of them were people having insufficient information for matching and follow-up) also had unresolved match status. During the missing data operation, residence status and match status were imputed for these unresolved cases. Table 9 shows the unresolved residence status by mover status. We observed the following from Table 9:

- Outmovers had considerably higher rate of unresolved residence status (18.45%) than nonmovers (1.65%);
- Twenty-nine percent of the people having unresolved residence status were outmovers.

Table 9. Unresolved residence status by mover status in the P sample (2000)

Mover status	Total		Imputed as matched residents		Imputed as not matched residents		Imputed as nonresidents	
	Count (a)	Unresolved rate	Count (b)	Percent of unresolved (b)/(a)	Count (c)	Percent of unresolved (c)/(a)	Count (d)	Percent of unresolved (d)/(a)
Nonmovers	4,145,706	1.65	1,803,116	43.49	1,383,029	33.36	959,562	23.15
Outmovers	1,698,565	18.45	793,660	46.72	538,598	31.71	366,308	21.57
All	5,844,272	2.25	2,596,776	44.43	1,921,626	32.88	1,325,870	22.69

Insufficient information for matching and follow-up by mover status can be found in Table C-1 in Appendix C.

4.3.2. *What were the proxy respondent rates by mover status?*

Proxy interviews were interviews with a nonhousehold member such as an apartment manager, a neighbor, a real estate agent, or a postal worker. Because the outmovers no longer lived at the sample address, information about whole household outmovers was collected from proxy interviews. Therefore outmovers had a substantially higher rate of proxy interviews than nonmovers. Information from proxy interviews was believed to be of poorer quality than that from interviews with a household member. Table 10 shows the proxy rate by mover status.

Table 10. Proxy rate by mover status in the P sample (2000)

Respondent type	Nonmovers		Outmovers		Nonmovers and outmovers	
	Count	Percent of nonmover	Count	Percent of outmover	Count	Percent of P-sample
Household member	242,898,218	96.90	2,302,519	25.00	245,200,737	94.35
Proxy	7,666,527	3.10	6,905,987	75.00	14,672,514	5.65

5. CONCLUSIONS

There was a smaller percentage of movers in the A.C.E. than in the 1990 PES because the A.C.E. started its personal interviewing earlier. Using the number of inmovers as an estimate of the number of movers, there were 5.1 percent movers in 2000, compared with 7.8 percent in 1990. The outmover to inmover ratio in the A.C.E. was 0.663, or approximately two to three.

The outmover match rates in the A.C.E. were higher than the inmover match rates in 1990, but the differences were not as big as we expected due to the change from Procedure B to Procedure C. Census late adds and whole person imputations might include high proportions of movers and might have reduced the mover match rates. The A.C.E. might have reduced false mover matches, too. The outmover match rates by major poststratum variables also fell in a more stable range in 2000 than in 1990. The biggest mover match rate improvements were among demographic groups that had the lowest match rates in 1990, such as American Indians on reservations, black, Hispanic, and non-owners.

In the A.C.E., the match rates for outmovers and nonmovers were 77.5 percent and 92.3 percent; the unresolved rates for outmovers and nonmovers were 18.45 percent and 1.65 percent; and the proxy respondent rates for outmovers and nonmovers were 75.00 percent and 3.10 percent. In the A.C.E., information for whole household outmovers was collected from proxy interviews.

We found no evidence that movers had more of an impact on the dual system estimates in the 2000 A.C.E. than in the 1990 PES. The fact that things were as we expected reassures us about the quality of the A.C.E.

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APPENDIX A.

In the following tables, I/N ratio is the inmover to nonmover ratio, and O/I ratio is the outmover to inmover ratio.

Table A-1. Mover ratios by region

Region	2000 A.C.E.		1990 PES
	I/N ratio	O/I ratio	I/N ratio
Northeast	0.048	0.579	0.071
Midwest	0.047	0.635	0.086
South	0.057	0.667	0.084
West	0.058	0.740	0.098
U.S.	**0.053**	**0.663**	**0.085**

Table A-2. Mover ratios by tenure

Tenure	2000 A.C.E.		1990 PES
	I/N ratio	O/I ratio	I/N ratio
Owner	0.030	0.605	0.048
Non-owner	0.112	0.701	0.173
U.S.	**0.053**	**0.663**	**0.085**

Table A-3. Mover ratios by race domain

Race domain	2000 A.C.E.		Race	1990 PES
	I/N ratio	O/I ratio		I/N ratio
Non-Hispanic White	0.049	0.705	Non-Hispanic White	0.084
Hispanic	0.069	0.568	Hispanic	0.094
Non-Hispanic Black	0.058	0.609	Black	0.079
AI on res	0.058	0.510	AI on res	0.009
AI off res	0.088	0.574		
API (non-Hispanic)	0.061	0.534	API	0.094
Hawaiian or PI	0.067	0.363		
Non-Hispanic Asian	0.060	0.546		
U.S.	**0.053**	**0.663**	**US**	**0.085**

Table A-4. Mover ratios by age sex group

Age sex group	2000 A.C.E.		1990 PES
	I/N ratio	O/I ratio	I/N ratio
1-17	0.054	0.556	0.081
18-29 Male	0.117	0.683	0.196
18-29 Female	0.115	0.685	0.199
30-49 Male	0.050	0.701	0.070
30-49 Female	0.044	0.688	0.064
50+ Male	0.028	0.754	0.038
50+ Female	0.027	0.757	0.033
U.S.	**0.053**	**0.663**	**0.085**

Table A-5. Mover ratios by tenure and type of basic address

Tenure and type of basic address	2000 A.C.E.		1990 PES
	I/N ratio	O/I ratio	I/N ratio
Owner, single-unit	0.028	0.587	0.046
Owner, multi-unit	0.052	0.645	0.054
Owner, other type of address	0.043	0.747	0.068
Non-owner, single-unit	0.097	0.698	0.163
Non-owner, multi-unit	0.123	0.701	0.176
Non-owner, other type of address	0.127	0.728	0.206
U.S.	**0.053**	**0.663**	**0.085**

APPENDIX B.

In the following tables, non-match rates shown are in percent, and standard errors are shown in parentheses. All 2000 non-match rates were computed using the Procedure C, which adjusted for the number of inmovers.

Table B-1. Non-match rates by region and mover status

Region	Nonmovers		Movers		P-sample	
	2000	1990	2000 (outmovers)	1990 (inmovers)	2000	1990
Northeast	7.9	7.1	22.2	24.1	8.5	8.2
	(0.3)	(0.5)	(1.8)	(1.7)	(0.3)	(0.5)
Midwest	5.7	4.4	17.5	20.6	6.28	5.7
	(0.2)	(0.3)	(0.9)	(1.4)	(0.2)	(0.3)
South	8.5	7.0	25.4	27.7	9.4	8.6
	(0.2)	(0.3)	(0.9)	(1.0)	(0.2)	(0.3)
West	8.1	6.6	23.0	25.5	8.9	8.3
	(0.3)	(0.3)	(1.1)	(1.2)	(0.3)	(0.3)
U.S.	**7.7**	**6.3**	**22.5**	**24.8**	**8.4**	**7.8**
	(0.1)	**(0.2)**	**(0.6)**	**(0.6)**	**(0.1)**	**(0.2)**

Table B-2. Non-match rates by tenure and mover status

Tenure	Nonmovers		Movers		P-sample	
	2000	1990	2000 (outmovers)	1990 (inmovers)	2000	1990
Owner	5.8	4.5	19.7	17.4	6.2	5.1
	(0.1)	(0.2)	(0.9)	(0.7)	(0.1)	(0.2)
Non-owner	12.2	10.8	24.3	29.9	13.4	13.6
	(0.2)	(0.4)	(0.7)	(1.0)	(0.2)	(0.4)
U.S.	**7.7**	**6.3**	**22.5**	**24.8**	**8.4**	**7.8**
	(0.1)	**(0.2)**	**(0.6)**	**(0.6)**	**(0.1)**	**(0.2)**

Table B-3. Non-match rates by race domain and mover status

Race domain	2000			Race	1990		
	Nonmover	Outmover	P-sample		Nonmover	Inmover	P-sample
Non-Hispanic white	6.2 (0.1)	20.7 (0.7)	6.8 (0.1)	Non-Hispanic white	4.9 (0.2)	21.9 (0.7)	6.2 (0.2)
Hispanic	11.5 (0.3)	26.7 (1.3)	12.5 (0.3)	Hispanic	10.7 (0.6)	33.5 (1.9)	12.6 (0.6)
Non-Hispanic black	12.3 (0.3)	26.5 (1.4)	13.1 (0.3)	Black	12.4 (0.5)	36.5 (1.8)	14.2 (0.5)
AI on res	13.4 (1.1)	23.9 (3.7)	14.0 (1.1)	AI on res	21.4 (4.1)	69.4 (10.3)	21.9 (4.1)
AI off res	10.6 (1.1)	32.0 (5.7)	12.1 (1.1)				
Asian, HawaiianPI (non-Hispanic)	9.1 (0.5)	22.5 (2.2)	9.9 (0.5)	API	7.7 (0.9)	31.9 (4.0)	9.8 (0.9)
PI	14.8 (2.5)	23.1 (7..9)	15.1 (2.5)				
Asian	8.8 (0.5)	22.4 (2.2)	9.7 (0.5)				
U.S.	**7.7 (0.1)**	**22.5 (0.6)**	**8.4 (0.1)**	**US**	**6.3 (0.2)**	**24.8 (0.6)**	**7.8 (0.2)**

Table B-4. Non-match rates by sex age group and mover status

Sex age group	Nonmovers		Movers		P-sample	
	2000	1990	2000 (outmovers)	1990 (inmovers)	2000	1990
1-17	8.4 (0.2)	7.0 (0.3)	23.0 (1.0)	26.0 (1.1)	9.2 (0.2)	8.5 (0.3)
18-29 Male	12.3 (0.3)	10.7 (0.4)	23.9 (1.0)	26.8 (0.9)	13.5 (0.3)	13.3 (0.4)
18-29 Female	10.3 (0.2)	9.1 (0.3)	21.9 (1.0)	24.3 (1.0)	11.5 (0.2)	11.6 (0.3)
30-49 Male	8.0 (0.2)	6.5 (0.2)	24.4 (1.0)	27.7 (1.3)	8.8 (0.2)	7.9 (0.3)
30-49 Female	6.4 (0.1)	5.2 (0.3)	22.1 (1.0)	22.2 (1.4)	7.1 (0.2)	6.2 (0.2)
50+ Male	5.9 (0.2)	4.2 (0.2)	20.5 (1.3)	20.8 (2.1)	6.3 (0.2)	4.8 (0.2)
50+ Female	5.4 (0.1)	3.6 (0.1)	18.2 (1.4)	17.7 (1.6)	5.7 (0.1)	4.1 (0.2)
U.S.	**7.7 (0.1)**	**6.3 (0.2)**	**22.5 (0.6)**	**24.8 (0.6)**	**8.4 (0.1)**	**7.8 (0.2)**

APPENDIX C.

Table C-1. Insufficient information by mover status in the P-sample (2000)

Mover status	Count	Percent
Nonmovers	2,123,996	0.85
Outmovers	928,323	10.08
All	3,052,319	1.17

Table C-2. Census Day interview status by mover status (2000, unweighted)

Census Day interview status	Nonmover household	Mover households			No P-sample people or valid inmovers present
	Households with at least one nonmover	Outmovers and inmovers present, no nonmovers	Outmovers only	Inmovers only	All other housing units
Interviews	245,626	4,277	4,272	n/a	n/a
Noninterviews	66	11	20	345	4,685
Field noninterviews	n/a	n/a	n/a	906	1,761
Vacant, deletes	n/a	n/a	n/a	6,932	32,012
Total	245,692	4,288	4,292	8,183	38,458

Table C-3. Interview day interview status by mover status (2000, unweighted)

Interview day interview status	Nonmover household	Mover households			No P-sample people or invalid inmovers present
	Households with at least one nonmover	Outmovers and inmovers present, no nonmovers	Outmovers only	Inmovers only	All other housing units
Interviews	245,680	4,288	18	8,183	5,934
Noninterviews	12	0	127	n/a	2,540
Field noninterviews	n/a	n/a	2	n/a	371
Vacant, deletes	n/a	n/a	4,145	n/a	29,613
Total	245,692	4,288	4,292	8,183	38,458

APPENDIX D TECHNICAL DOCUMENTATION

D.1. A list of files and variables used to produce results in this report

D.1.1. P-sample person dual system estimation output file

File name: PDSEUS.DAT (see Haines (2001a) for detail file specifications))

      MOVERPER.(person mover flag),
      REGION (census region),
      TENURE2 (recoded tenure),
      DOMAIN (A.C.E. race/Hispanic origin domain),
      AGESEX (age/sex post-stratification variable),
      RPROB (probability of residence),
      MPROB (probability of match),
      TESFINWT (P-sample final TES-adjusted weight for Census Day),
      NIWGTI (P-sample noninterview adjusted weight based on A.C.E. interview day interview status),
      RSC (computer residence status code),
      FINOUTC (final A.C.E. outcome code for Census Day),
      FINOUTI (final A.C.E. outcome code for interview day),
      PROXYIN (proxy/nonproxy respondent),
      FINMAT (final match code).

D.1.2. Housing unit CAPI interview master file

File name: HUINT.SAS$EBDATA
      MFY (mover flag Y)
          1=currently occupied by Census Day (CD) residents
          2=information collected about CD residents who have moved out
          3=vacant on CD
          4=did not exit or not a HU on CD
          5=noninterview for CD residents
          6=refusal for CD residentsbut we know they are inmovers
      INTDATE (date of interview)
          MMDDYYYY
      PRXFLG (proxy interview)
      RESPNUM (respondent line number)

D.1.3. CAPI interview person record file

File name: PERINT.SAS$EBDATA
        RECTYPE1 (type of records)
        1=HU record
        2=ACE person
        3=PRX person
        4=OMP person
        5=deleted record

D.1.4. Post-collapsed post-stratum summary file

File name: PSPOSTUS.DAT (see Haines (2001a) for detail file specifications))

        WTNONNUM (weighted number of P-sample nonmovers),
        WTNONMAT (weighted number of P-sample nonmover matches),
        WTOUTNUM (weighted number of P-sample outmovers),
        WTOUTMAT (weighted number of P-sample outmover matches),
        WTINNUM (weighted number of P-sample inmovers),
        WTCENUM (weighted number of E-sample correct enumerations),
        WTENUM (weighted number of E-sample people),
        OUTSSIZE (P-sample outmover sample size),
        C   (HCEF Census count including late adds),
        DD*   (HCEF data-defined persons).

D.2. Recoded variables

-      Mover status (Table 1).

Nonmovers	MOVERPER=1
Whole household outmovers	MOVERPER=3 and ((RECTYPE1=4) or (MFY = 2))
Partial household outmovers	MOVERPER=3 and RECTYPE1 …4 and MFY ..2
Whole household inmovers (had outmovers)	MOVERPER=2 and (RECTYPE1= 4 or (4 # FINOUTC #12)) and at least one member of the household with MOVERPER=3
Whole household inmovers (no outmovers)	MOVERPER=2 and (RECTYPE1=4 or (4 # FINOUTC #12)) and the household doesn't contain any member with MOVERPER=3

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| Partial household inmovers | MOVERPER=2 and (RECTYPE1 …4 and (FINOUTC <4) |

- Respondent type (Table 10).

| Proxy | PROXYIN=1 or PRXYFLG=1 or RESPNUM=99 |
| Non-proxy | Otherwise |

- Housing unit mover status (Table C-2 and Table C-3)

Nonmovers	Has at least one person with MOVERPER=1 or (MOVERPER=2 and MFY=1) or (MOVERPER=3 and RECTYPE1 …4)
Outmovers and inmovers present, no nonmovers	No person with MOVERPER=1, has at least one person with MOVERPER=2 and at least one person with MOVERPER=3, all persons with MOVERPER=2 have MFY ..1 and all persons with MOVERPER=3 have RECTYPE1= 4
Outmovers only	All persons have MOVERPER=3 and RECTYPE1=4
Inmovers only	All persons have MOVERPER=2 and MFY ..1
All other housing units	Otherwise